

**WETLAND INVENTORY UPDATE
YEAR 6 SYNTHESIS REPORT
2010**



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Water Resources Division
Lummi Natural Resources Department
Lummi Indian Business Council

LUMMI NATION

WETLAND INVENTORY UPDATE
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2010

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TABLE OF CONTENTS

1. INTRODUCTION	2
2.1 METHOD FOR WETLAND MAPPING/BOUNDARY DETERMINATION	7
2.2 METHOD FOR WETLAND FUNCTION ASSESSMENT	9
2.3 METHOD FOR WETLAND RATING/CLASSIFICATION.....	10
2.4 METHOD FOR UPDATING THE LUMMI NATION GIS WETLAND INVENTORY/DATABASE	11
3. WETLAND INVENTORY UPDATE RESULTS.....	12
3.1 RESULTS OF WETLAND MAPPING AND BOUNDARY DETERMINATION DURING 2010	12
3.2 RESULTS OF FUNCTION ASSESSMENT.....	17
4. DISCUSSION.....	18
5. REFERENCES	21

Appendix A – Individual Wetland Maps

Appendix B – Wetland Rating Worksheets

1. INTRODUCTION

The Lummi Indian Reservation (Reservation, see Figure 1) is located along the western boundary of Whatcom County, Washington and includes the mouth of the Nooksack and Lummi rivers. Both the Nooksack and Lummi river watersheds are under environmental pressures from rapid regional growth. The Lummi Nation has also entered a period of rapid economic development under self-governance. Growth on and near the Reservation requires that the Nation's core environmental program prioritize the development of a regulatory infrastructure that is technically sound, legally defensible, and administratively efficient and that allows for growth while protecting tribal resources and the Reservation environment. This regulatory infrastructure supports both the tribal goal and the Environmental Protection Agency (EPA) policy of tribal self-governance and recognition of sovereignty.

Previous EPA and other funding sources have supported the Lummi Nation's assessment of priority water resource needs and the identification of unmet needs. Environmental planning intended to protect the Nation's water resources has included development of a Storm Water Management Program (LWRD 1998a), a Wellhead Protection Program (LWRD 1997, LWRD 1998b), a Wetland Management Program (LWRD 2000), a Non-Point Source Management Program (LWRD 2001, LWRD 2002), and Water Quality Standards for Surface Waters of the Lummi Indian Reservation (LWRD 2008). These programs are components of a comprehensive water resources management program (CWRMP) being developed and implemented pursuant to Lummi Indian Business Council (LIBC) resolutions No. 90-88 and No. 92-43.

In January 2004, the Lummi Nation Water Resources Protection Code (Title 17 of the Lummi Code of Laws [LCL]) was adopted. Based on a Reservation-wide wetland inventory completed in 1999 (Harper 1999) and as described in Chapter 17.06 (Stream and Wetland Management) of LCL Title 17, different types of wetlands that vary in their quality and importance occur on the Reservation. In order to establish appropriate levels of protection, pursuant to LCL Chapter 17.06 the Reservation wetlands must be classified into one of four categories. Category 1 wetlands are considered critical value wetlands that have a high and irreplaceable level of importance for fisheries, Lummi culture, and/or water quality on the Reservation. Category 2 wetlands are difficult to replace, but not impossible. They provide high levels of some functions and still need a high level of protection. Category 3 wetlands provide a moderate level of functions and are often less diverse. Category 4 wetlands have minimum habitat value and are suitable for restoration or enhancement efforts.

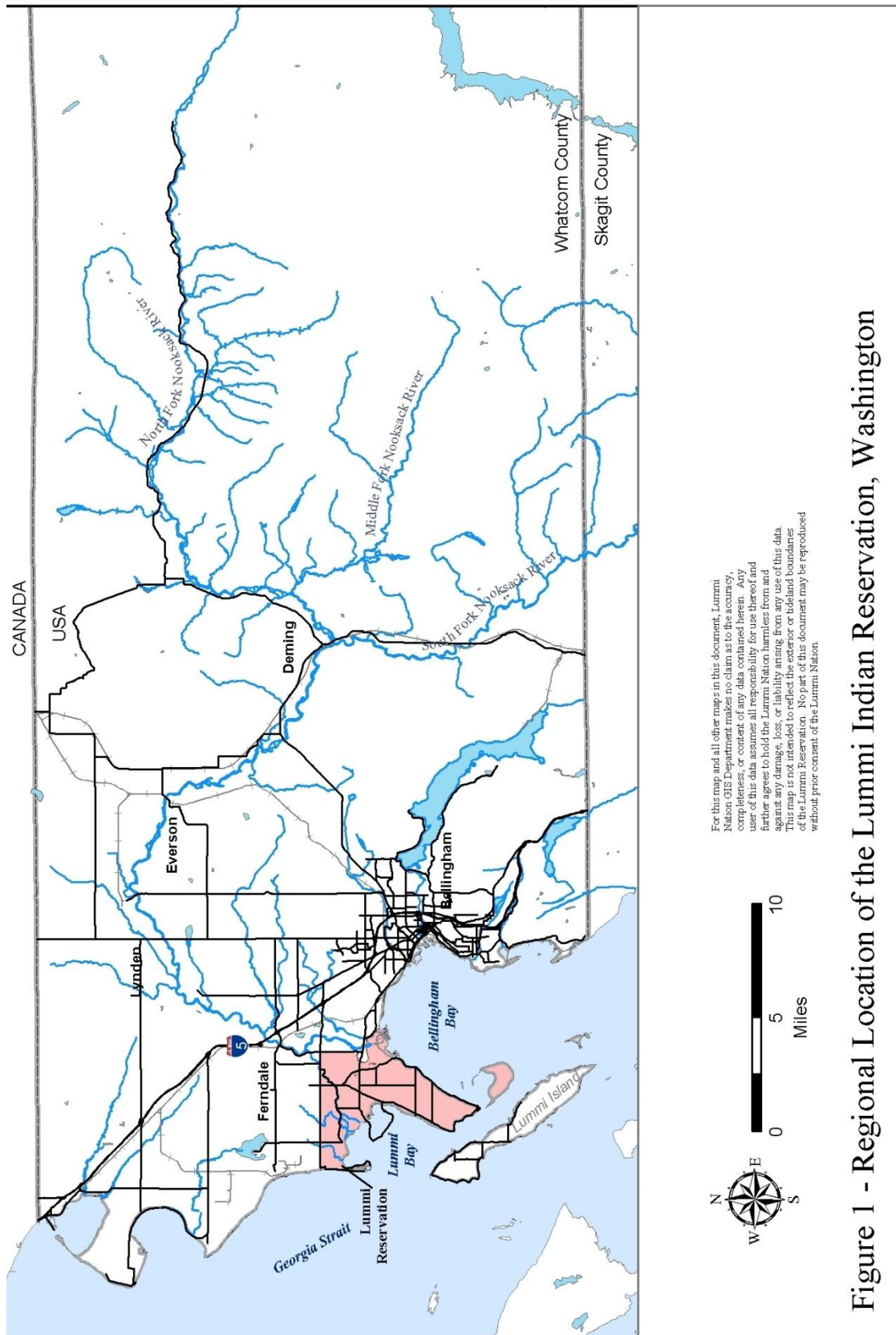


Figure 1 - Regional Location of the Lummi Indian Reservation, Washington

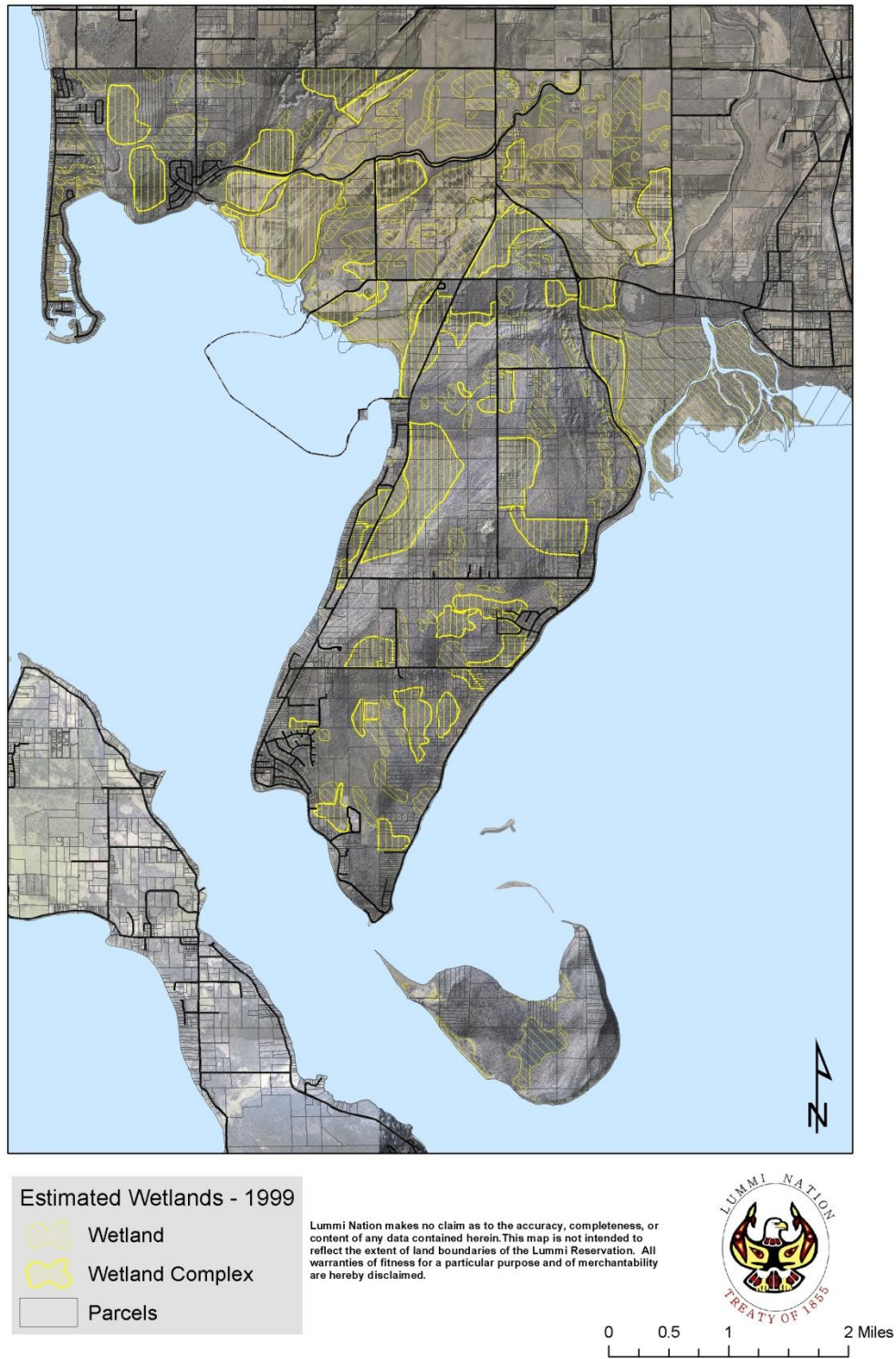
The purpose of the 1999 Reservation-wide wetland inventory was to identify wetland locations and to collect information on the characteristics and functions of the Reservation wetlands. The 1999 Reservation-wide wetland inventory (Harper 1999) relied largely on remotely sensed data (i.e., color and infra-red aerial photographs), generalized mapping (i.e., USDA soil survey), and limited field verification to identify wetland locations and sizes. In addition to identification and mapping, the 1999 inventory collected general wetland information including Cowardin classification (Cowardin et al. 1979), water source, and soil type. The Washington State Function Assessment Method was applied to 12 assessment units (AUs) in 9 selected wetlands on the Reservation. The 1999 inventory identified and mapped a total of 214 wetlands and wetland complexes on the Reservation (Figure 2). These wetland areas totaled 5,432 acres, or roughly 43 percent of the land area of the Reservation, excluding tidelands. Approximately 60 percent of these mapped wetland areas are located in the flood plains of the Lummi and Nooksack rivers.

Although the 1999 inventory represents an important planning tool and a significant improvement over the previously available information, which was largely from the National Wetlands Inventory (USFWS 1987), the 1999 inventory has proven to be too general for many planning efforts. The 1999 inventory either did not map some wetlands or generally shows larger wetland areas than are surveyed in the field or identified using Global Positioning System (GPS) technology. Refining the spatial resolution of wetland mapping, performing function assessments, and classifying the wetlands into the regulatory categories identified in Title 17 is intended to support efforts to protect these wetland resources and the important ecological, hydrological, and water quality protection functions that they provide. Because of the large number of wetland areas on the Reservation, the effort to refine the spatial resolution of the wetland mapping, to perform function assessments, and to classify the Reservation wetlands is projected to require several years to complete. This report summarizes the results of Year 6 of this inventory update effort.

As described in more detail below, a wetland-consulting firm was contracted following Year 3 of the update effort to provide an independent program evaluation and quality assurance/quality control review. As a result of this evaluation and review, the function assessment element of the wetland inventory update effort was de-emphasized during Year 4. For this Year 6 update effort and future update efforts, function assessments are deferred for wetlands until a development activity is imminent and the assessment is needed to determine appropriate mitigation measures for any unavoidable wetland impacts.

For the purposes of this inventory update, a wetland evaluation consists of conducting a site visit(s), performing at least a detailed reconnaissance-level delineation, using a mapping grade GPS unit to map the identified wetland boundaries, and classifying the wetlands into one of the four categories.

Figure 2 - 1999 Wetland Inventory Results



This approach to updating the Reservation-wide wetland inventory resulted in the evaluation of 6 wetlands during Year 6. In addition, two wetland areas that were delineated and documented in 2003 but that have not been identified in previous update reports are included in this Year 6 report. In total, eight wetlands are identified as part of this Year 6 effort (approximately 4 percent of the total number of wetlands identified during the 1999 inventory). When combined with the 36 wetlands identified during Year 1, 35 wetlands identified during Year 2, 20 wetlands identified during Year 3, 14 wetlands identified during Year 4, and 48 wetlands identified during Year 5, a total of 161 wetlands (approximately 75.20 percent) of the Reservation wetlands have been evaluated.

Based on this experience and assuming the same evaluation methodology and rate, additional time will be required to complete an evaluation of all of the Reservation wetlands.

This Year 6 wetland inventory update synthesis report is divided into the following sections:

- Section 1 is this Introduction section.
- Section 2 describes the methods used to conduct the mapping and categorization of Reservation wetlands.
- Section 3 presents a summary of the Year 6 wetland inventory update results.
- Section 4 provides a discussion of the Year 6 results.
- Section 5 lists the references cited in the report.

Appendix A contains a map of each wetland mapped during the sixth year of the inventory update. The results from Year 1, Year 2, Year 3, Year 4, and Year 5 are summarized in similar synthesis reports (LWRD 2005, LWRD 2006, LWRD 2007, LWRD 2009, and LWRD 2010). The field notes and categorization worksheets for each wetland and function assessment are on file with the Lummi Water Resources Division. Appendix B contains an example of a field wetland categorization completed during the Year 6 effort. Because no development actions were planned that would impact wetlands during Year 6, no function assessments were completed.

2. METHODS FOR WETLAND INVENTORY UPDATE

The methods used to update and refine the spatial resolution of the 1999 inventory are described below. Lummi Water Resources staff and a consulting firm (Northwest Ecological Services) hired by the Lummi Planning Department, the Lummi Housing Authority, or the Lummi Tribal Sever and Water District collected and interpreted the field data summarized in this update.

Four inter-related methods were used to update and refine the 1999 inventory. The different methods were used for wetland mapping/boundary determination,

wetland function assessment, wetland rating/classification, and for updating the Lummi Nation GIS wetland inventory/database.

2.1 Method for Wetland Mapping/Boundary Determination

Because of property access issues and the remoteness and size of some of the Reservation wetlands, it is not practical to undertake a geography-based approach (i.e., watershed by watershed) to selecting the wetlands evaluated during this study. Instead, the locations of the wetlands evaluated during this inventory update were based on areas where property was considered for purchase by the LIBC, development actions were contemplated, and/or on parcels for which Lummi Land Use Permit Applications were submitted to the Lummi Planning Department.

During the planning stages for this update effort, it was estimated that approximately 70 wetlands could be evaluated during one year (approximately three days per wetland). This estimate proved to be overly optimistic due to a number of factors including property access issues and the remoteness and size of some of the wetlands. There were also seasonal considerations including long periods of flooding, frozen ground, and snow that limited and/or prevented wetland boundary determination during portions of the winter season. During the summer season, mapping forested wetland areas is problematic because GPS satellite signals are often difficult to obtain through the dense tree canopy.

Of the 214 wetlands on the Reservation that were mapped during the 1999 inventory, 8 wetland areas were field verified and mapped as part of this Year 6 effort. No function assessments were conducted and ratings/classifications were performed on all 8 of the wetland areas during this inventory update effort (approximately 4 percent of the total number of inventoried wetlands during 1999).

In several cases, development actions were planned on a parcel of land where the 1999 inventory indicated that large wetlands or wetland complexes were located over contiguous parcels. Because acquiring landowner permission is time consuming – particularly for undivided parcels in trust status that may have in excess of 100 landowners, in many cases only a portion of the wetland boundary on the particular parcel where the development action was planned was mapped. As a result, there are several wetlands and numerous fragments of wetlands that have been mapped by Lummi Water Resources Division staff during the last several years. These areas are mapped or partially mapped and appear in Figure 3, Figure 4, and Appendix A. Work is in progress on these areas, and function assessments and classification/ratings have not yet been performed due to time constraints, adverse weather, and/or other reasons. These areas have been archived in the Lummi Nation Geographic Information System (GIS) so that work can continue on these wetlands and mapping,

function assessments, and categorization can be finalized in the future as this wetland inventory update is completed.

Once a wetland from the 1999 inventory or a land parcel is selected for evaluation, the methodology used to reliably identify and map the wetland boundaries is the following:

1. Prior to conducting a field visit, available remotely sensed data including high resolution aerial photography collected during 2004 and 2008 (approximately 0.5 feet resolution) and high-resolution (approximately ± 0.5 feet accuracy) topographic information acquired in 2005 using Light Detection and Ranging (LiDAR) technology are reviewed. Maps developed as part of the USDA soil survey for the area (USDA 1992) are also reviewed.
2. Information developed during the 1999 wetland inventory, including watershed name and size, wetland size, Cowardin classes present, association with streams or other water resources, and USDA soil units in the vicinity are reviewed.
3. During the field visit(s), one of the following two methods for determining wetland boundaries are used:
 - If development activities are planned that would potentially impact wetlands, or a jurisdictional determination of the wetland boundary is required, the wetland boundary is determined in the field using the criteria and methodology of the Wetland Delineation Manual (Manual) issued by the U.S. Army Corps of Engineers (COE 1987) and/or the criteria and methodology in the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (COE 2008). The manuals require examination of three parameters: vegetation, soils, and hydrology. The methodology in the 2008 manual is implemented for all wetland determinations. This methodology requires evidence of at least one positive wetland indicator for each of the three parameters (vegetation, soils, and hydrology) to make a positive wetland determination. The specified criteria are mandatory and must all be present under normal environmental conditions. Once delineated, the wetland boundaries are recorded using a handheld Trimble GeoXT GPS unit, and downloaded into the ArcMap9 GIS software program. The horizontal accuracy of the Trimble GeoXT GPS unit is ± 2 feet once the collected data are post-processed.
 - If development activities are not planned, and or other conditions make locating the boundary difficult (e.g., lack of satellite configuration for the GPS unit, lack of permission to access property), a “reconnaissance-level” boundary determination is made instead of a jurisdictional determination. Much more time would be required if jurisdictional determinations were made on all the wetlands because wetland data plots along regularly spaced transects would be required. For the reconnaissance level determinations, the same criteria are applied but

in a less formal manner, or in some cases, only a portion of the wetland edge was recorded using a GPS unit, and the rest of the wetland boundary estimated using a combination of other methods (e.g., aerial photography and LiDAR). In some cases, portions of the wetland boundaries were recorded using a combination of an on-the-ground reconnaissance, GPS data, soil mapping, LiDAR data, and recent aerial photography.

2.2 Method for Wetland Function Assessment

Pursuant to the recommendations from the independent program evaluation/review completed by ESA Adolfson during October through December 2007 (ESA Adolfson 2008), wetland function assessments are now being deferred until a development action is planned that will impact a wetland and a function assessment is required to determine appropriate mitigation for unavoidable wetland impacts. This program modification is anticipated to allow more of the Reservation wetlands to be visited during a year and to accelerate the completion of the inventory update. Although this Year 6 update effort did not require a function assessment, the method implemented by Lummi Nation is described below.

When wetland function assessments are conducted on the Lummi Reservation, in accordance with Lummi Administrative Regulation (LAR), specifically 17 LAR 06.030, the *Methods for Assessing Wetland Functions, Volume 1* by the Washington State Wetland Function Assessment Project (Hruby et al. 1999) are used. The Washington Method (commonly called WAFAM) is based on the nationally recognized Hydrogeomorphic (HGM) approach (Brinson 1993), which classifies wetlands based on landscape position and water regime, and provides guidance on arriving at technical assumptions on which performance assessments of functions are based. The HGM method proposes the following classes of wetlands: Depressional, Fringe, Slope, Riverine, and Flats (Brinson 1993).

The Washington State technical committee has thus far developed assessment methods only for depressional and riverine wetlands. Most of the wetlands on the Lummi Reservation fall into these two categories, although estuarine fringe and flats are also clearly present.

The WAFAM (Hruby et al. 1999) relies on indicators of functions to assess potential performance, rather than direct measurements. Indicators are usually physical characteristics of the wetland or its surrounding area that can be correlated to a specific function. For example, rather than trying to directly sample aquatic mammals, the presence of steep banks in the wetland can be used as an indicator of the suitability of the wetland habitat for aquatic mammals. After collecting detailed data on indicators, mechanistic models (mathematical equations) are applied to the data to arrive at a numeric index score. This step is based on the assumption that the relationship between indicators and the actual

performance level for a function can be defined by a simple mathematical expression. Different models were developed for each subclass of wetland and for each function category (Hruby et al. 1999).

The first step in assessing wetland functions is to divide the wetland into assessment units (AUs). Wetlands are divided into AUs based on differences in water regime. The AU boundary occurs where the volume, flow, or velocity of the water changes rapidly, whether created by natural or artificial features. An entire wetland may be uniform in its water regime and would therefore be comprised of a single AU.

As noted above, the WAFAM method relies on indicators of functions to assess potential performance rather than direct measurements. A total of fifteen (15) categories of functions are assessed for each wetland under the WAFAM method. The indices that result for each wetland function represent an assessment of performance relative to standard reference wetlands identified as having the highest level of performance within that wetland subclass.

The assigned function index reflects the level of performance per unit area of the wetland being assessed. Another calculation must be made to factor in the size of the assessment unit to get a final performance index for each function of a particular assessment unit. The index denotes the assessed potential performance or habitat suitability based on the structural characteristic present in and around the assessment unit. The index does not denote the actual performance, as that would require detailed monitoring. It is assumed that the assessment unit will perform the function if the appropriate structural components are present and if the opportunity exists. A low index (i.e., 1,2,3) for a function does not necessarily mean the wetland is “unimportant.” It may be the only wetland in the area providing certain functions.

2.3 Method for Wetland Rating/Classification

Pursuant to 17 LAR 06.030, the Washington State Department of Ecology’s *Wetland Rating System for Western Washington – Revised* (Hruby 2004) was used to classify Reservation wetlands. This document is a revision of the *Washington State Wetland Rating System for Western Washington*, published by the Department of Ecology in (Ecology 1991). The 2004 version was used for all wetlands inventoried for this Year 6 effort.

The current version of the wetland classification system was designed to differentiate between wetlands based on their sensitivity to disturbance, their significance, their rarity, the ability to replace them, and the functions they provide. The classification system results in rating wetlands into one of the following four categories:

- Category 1 wetlands are those that represent a unique or rare wetland type, or are more sensitive to disturbance than most wetlands, or are

relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime, or provide a high level of functions (scores > 70 points).

- Category 2 wetlands are difficult, though not impossible to replace, and provide high levels of some functions (scores between 51 – 69 points). These wetlands occur more commonly than Category 1 wetlands, but still need a relatively high level of protection.
- Category 3 wetlands are wetlands with a moderate level of functions (scores between 30 – 50 points). They have been disturbed in some ways, and are often less diverse or more isolated from other natural resources in the landscape than Category 2 wetlands.
- Category 4 wetlands have the lowest levels of functions (scores less than 30 points) and are often heavily disturbed. These are wetlands that could be replaced, and in some cases, improved. These wetlands may provide some important ecological functions, and also need to be protected.

The rating categories were largely adopted in LCL Title 17. The categories are intended to be the basis for wetland protection and management to reduce further loss of their value as a resource. Some decisions that can be made based on the rating include the width of buffers needed to protect the wetland from adjacent development, the mitigation ratios needed to compensate for impacts to the wetland, and permitted uses in the wetland. The wetland categorization or rating is the basis for determining the size of wetland buffers on the Reservation (LCL Title 17).

As a component of the rating process, a classification key was used to determine whether the wetland was riverine, depressional, slope, lake-fringe, tidal fringe, or tidal flats according to the HGM classification system.

2.4 Method for Updating the Lummi Nation GIS Wetland Inventory/Database

As described in Section 2.1, the updated wetland boundaries were recorded using a mapping-grade Trimble GeoXT GPS unit, and downloaded into ArcMap9 GIS software. Once entered into the GIS, any newly identified wetland areas were assigned an identification number based on the Public Land Survey System (Township, Range, and Section). If a newly delineated wetland area essentially replaced an existing wetland, the original identification number was retained. If a new wetland was identified, a new number based on the Public Land Survey System was assigned. Other data that were entered into the GIS database for new wetlands included wetland area in acres and hectares, comments about location or other unique features of the wetland, wetland rating/classification, hydrogeomorphic classification, Cowardin classification, the date the wetland was mapped, and watershed name. The Lummi Water Resources Division started developing a new Access database during 2007 to better manage the collected information on the Reservation wetlands. This database needs additional work and trouble shooting before it can be fully operational.

3. WETLAND INVENTORY UPDATE RESULTS

The results from Year 6 of the wetland inventory update are summarized below. Detailed field forms for the wetland areas are maintained on file at the Lummi Water Resources Division office. An example of the documentation is included as Appendix B.

3.1 Results of Wetland Mapping and Boundary Determination during 2010

The 8 wetland areas on the Lummi Reservation that were field-verified and mapped for the Year 6 wetland inventory update effort are shown in Figure 3. Detailed maps of each of these wetland areas are presented in Appendix A. Figure 3 and each of the detailed maps presented in Appendix A show the wetland boundaries determined during the various years using different colors. The wetland boundaries identified as part of the Year 6 inventory update are shown in cyan, Year 5 in magenta, Year 4 in red, Year 3 in brown, Year 2 in blue, Year 1 in green, and the estimated wetland boundaries from the 1999 inventory in yellow. As summarized in Table 1, a total of approximately 202 acres of wetlands were mapped as part of the Year 6 update. A comparison of the wetland acreage mapped during the first six years of this update effort is also summarized in Table 1.

Table 1. Comparison of Wetland Areas Evaluated by Program Year

Year	Number of Wetlands Evaluated	Evaluated Wetland Area (acres)
1 (2005)	36	1,104
2 (2006)	37	579
3 (2007)	20	380
4 (2008)	14	28
5 (2009)	48	125
6 (2010)	8	202
Total	163	2,418

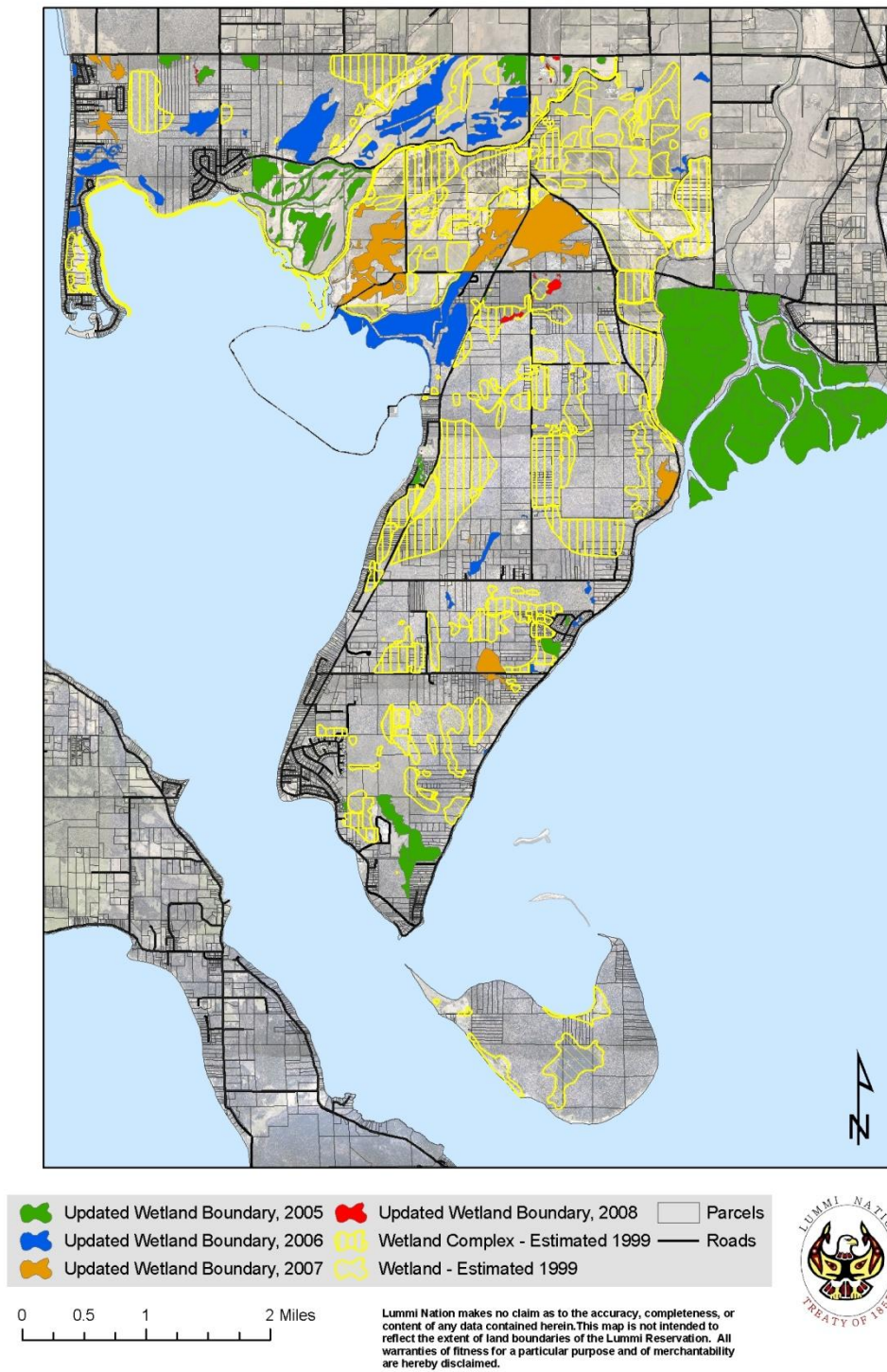
The annual variations in the reported acreage of mapped wetlands are due to a number of factors including:

- The Year 1 Report summarized work that occurred over a period of almost 3 years.
- The Year 2 Report summarized work that occurred over a 1-year period.
- The Year 3 Report summarized work that occurred over a 9-month period with a reduced work week as the Water Resources Planner II worked only 32 hours a week starting in June 2006.
- The Year 4 Report summarizes work that occurred over an 11-month period that included a Quality Assurance/Quality Control effort with ESA

Adolfson, a re-verification of some wetland boundaries by Douglass Consulting, and the reorganization of the Lummi Natural Resources Water Resources Division. This reorganization eliminated the Water Resources Planner II position and created a Water Resources Planner I position. The staff transition included an investment in formal training and practical/field applications with various wetland scientists, which reduced the amount of time available to advance the wetland inventory update effort.

- The Year 5 Report summarizes work that occurred over a 1-year period including work completed in conjunction with wetland contractors hired by the Lummi Planning Department, Lummi Housing Authority, or the Lummi Tribal Sewer and Water District.
- This Year 6 Report summarizes work that occurred over a 1-year period including work completed in conjunction with wetland contractors hired by the Lummi Planning Department, Lummi Housing Authority, or the Lummi Tribal Sewer and Water District. Although fewer wetlands were evaluated during Year 6 compared to previous years, the acreage/area of the evaluated wetlands was greater than the wetland area evaluated during Year 4 and Year 5 combined.

Figure 3 - Updated Wetland Boundaries and Estimated Wetland Locations



As shown in Figure 3 and the higher resolution mapping presented in Appendix A, the boundaries of some of the wetlands evaluated during Year 6 changed to in comparison to the 1999 inventory. The wetland mapping and boundary determinations made during Year 6 and the associated wetland sizes compared with the 1999 inventory results are shown in Table 2.

A total of eight wetland areas on the Reservation were evaluated as part of the Year 6 wetland inventory update project (Table 2). As summarize in Table 2, four of the wetland areas inventoried and mapped during Year 6 were not identified in the 1999 inventory. One of these 4 wetland areas (38N2E06-14b) delineated during Year 6 is an expansion of a wetland area delineated in 2006 that was identified in the 1999 inventory. The area that was delineated in 2006 is mentioned in the Year 2 update, and because the 2006 and 2010 wetland areas are connected the same wetland name 38N2E06-14 is used. For the purpose of this Year 6 update and Lummi GIS layer the newly identified wetland area is given 38N2E06-14b. Table 2 lists these eight wetlands and their verified acreage. As a result there are 4 newly identified wetland areas for this Year 6 update with a combined total of 36.98 acres. When combined with the Year 1, Year 2, Year 3, Year 4, and Year 5 wetland inventory update results (LWRD 2005, LWRD 2006, LWRD 2007, LWRD 2009), a total of 60 wetland areas totaling 122.18 acres have been identified that were not identified in the 1999 inventory. Because the size of the inventoried wetlands have been more accurately determined as part of the wetland inventory update project, in some cases the acreage has increased and in other cases the wetland acreage has decreased. When combined with the results from Year 1, Year 2, Year 3, Year 4, and Year 5 (LWRD 2005, LWRD 2006, LWRD 2007, LWRD 2009, and LWRD 2010), the net change in the total acreage of Reservation wetlands relative to the 5,432 acres inventoried in 1999 has been a decrease of approximately 437.82 acres. The net result from Year 6 update is a 37.58 acre increase in the total acreage of Reservation wetlands relative to the 1999 inventory results.

Table 2 – Wetland Size Comparison Results

Wetland ID Number	Watershed Identification	1999 Inventory Wetland Size (Acres)	Inventory Update Wetland Size (Acres)	Difference in Wetland Size (Acres)
38N1E24-15	I	0 ¹	0.70	+0.70
38N2E07-03	K	118.45 ²	118.45	0
38N2E07-04	K	43.43 ³	43.43	0
38N2E06-14b	K	0 ⁴	20.0	+20.0
38N1E26-13	H	2.0 ⁵	1.90	-0.10
38N1E13-10	K	0.8 ⁶	1.50	+0.70
38N1E12-26	K	0 ¹	15.88	+15.88
38N1E12-27	K	0 ¹	0.40	+0.40
	Total	164.68	202.26	+37.58

Notes:

¹ Wetlands not identified in the 1999 Inventory.

² Northwest Ecological Services estimated the wetland to be approximately 125.0 acres in size. The Lummi Natural Resources (LNR) GIS layer calculated the wetland to be 118.45 acres.

³ Northwest Ecological Services estimated the wetland to be approximately 48.0 acres. The Lummi Natural Resources (LNR) GIS layer calculated the wetland to be 43.43 acres.

⁴ As previously mentioned wetland numbered 38N2E06-14 is identified in the 1999 inventory. It was field-verified in 2006 and mentioned in the Year 2 update. An extension of this wetland was identified and delineated as part of this Year 6 effort, and because the area delineated for this Year 6 update does not indicate a 1999 inventory wetland area a 0 is placed in Table 2 for the purpose of this Year 6 effort calculation.

⁵ The 1999 Inventory size is 10.96 acres, due to access considerations, 2.0 acres were field verified for the Year 6 update, which resulted in a -0.10 acre difference. As part of the update effort 0.40 acre of the 10.96 acres 1999 wetland was field verified in 2008 and mention in the Year 4 update. As a result a 0.02 acre wetland was identified, which resulted in a -0.38 acre difference. A total of 2.40 acres of the 10.96 acres 1999 Inventory wetland has been field verified, resulting a total of 8.56 acres of un-verified wetland.

⁶ The 1999 Inventory size is 15.69 acres, due to access considerations 0.80 acre were field verified for the Year 6 update, which resulted in a +0.70 acre difference.

3.2 Results of Function Assessment

Pursuant to the recommendations from the independent program review conducted by ESA Adolfson (ESA Adolfson 2008), wetland function assessments are generally no longer conducted as part of the inventory update effort. Function assessments are only conducted if a development action is planned that will impact a wetland. A function assessment is required to determine appropriate mitigation for unavoidable wetland impacts. During the period of this Year 6 update no function assessments were required. Lummi Natural Resources will file all required function assessments at the Water Resources Division office.

3.3 Results of Wetland Classification

Pursuant to 17 LAR 06.030, the Washington State Wetland Rating system (Hruby 2004) was applied to all 8 evaluated wetland areas. Table 4 presents the ratings for the AU's.

Of the wetlands evaluated during Year 6, two were rated as Category 1 wetlands, two were rated as Category 2 wetlands, four were rated as Category 3 wetlands, and none were rated as Category 4 wetlands.

Category 1 wetlands are deemed high value and important to the ecosystem. The two Category 1 wetlands (38N2E07-03 and 38N2E07-04) mentioned above and identified in Table 4 are part of the Lummi Natural Resources Restoration Department Smuggler's Slough enhancement project. The Cowardin vegetation classes for the two wetlands are determined to be PEM/PSS/PFO.

The Washington State Wetland Rating system uses only the highest grouping in the HGM classification (i.e., wetland class).

Table 4 – Wetland Rating and HGM Classification

Wetland ID Number	Watershed Identification	Wetland Rating	HGM Class
38N1E24-15	I	3	Depressional
38N2E07-03	K	1	Depressional/Riverine
38N2E07-04	K	1	Depressional/Riverine
38N2E06-14b	K	2	Depressional
38N1E26-13	H	3	Depressional
38N1E13-10	K	3	Depressional
38N1E12-26	K	2	Depressional
38N1E12-27	K	3	Depressional

4. DISCUSSION

Accurate information on wetland locations and areal extent, wetland category, and wetland functions is needed to effectively manage Reservation wetlands pursuant to the Lummi Nation Water Resources Protection Code (LCL Title 17) and associated Lummi Administrative Regulations. Although the 1999 inventory represents an important planning tool and a significant improvement over the previously available information, it has proven to be too general for many planning efforts. Refining the spatial resolution of the wetland mapping and classifying the wetlands into the regulatory categories identified in Title 17 is intended to support efforts to protect these wetland resources and the important ecological, hydrological, and water quality protection functions that they provide. Because of the large number of wetland areas on the Reservation, the effort to refine the spatial resolution of the wetland mapping and to classify the Reservation wetlands is projected to require several years to complete. This report summarizes the results of Year 6 of this inventory update effort.

The overall result of the inventory update effort will be a more accurate GIS data layer and an associated database that contains the classification and other summary information about each wetland on the Reservation. Hard copies of field notes (e.g., wetland rating worksheets, function assessment work sheets, location maps) are maintained in binders in the Lummi Water Resources Division office. Until the update effort is completed, the GIS data layer and associated database will be a work in progress. The current version of the Lummi Reservation Wetland Map is shown in Figure 4. Figure 4 shows the information in Figure 3 except that the 1999 wetland locations that were revised during Year 1 through Year 6 of this update effort has been modified accordingly. Figure 4 is intended to reflect the best available information on Reservation wetlands.

As described previously, Year 6 of this inventory update resulted in revising the locations and extent of 8 wetland areas and classifying all 8 wetlands into one of four categories. Based on the changes to the spatial locations and the utility of the collected information on wetland function and category, the inventory update is recommended to continue until it is completed.

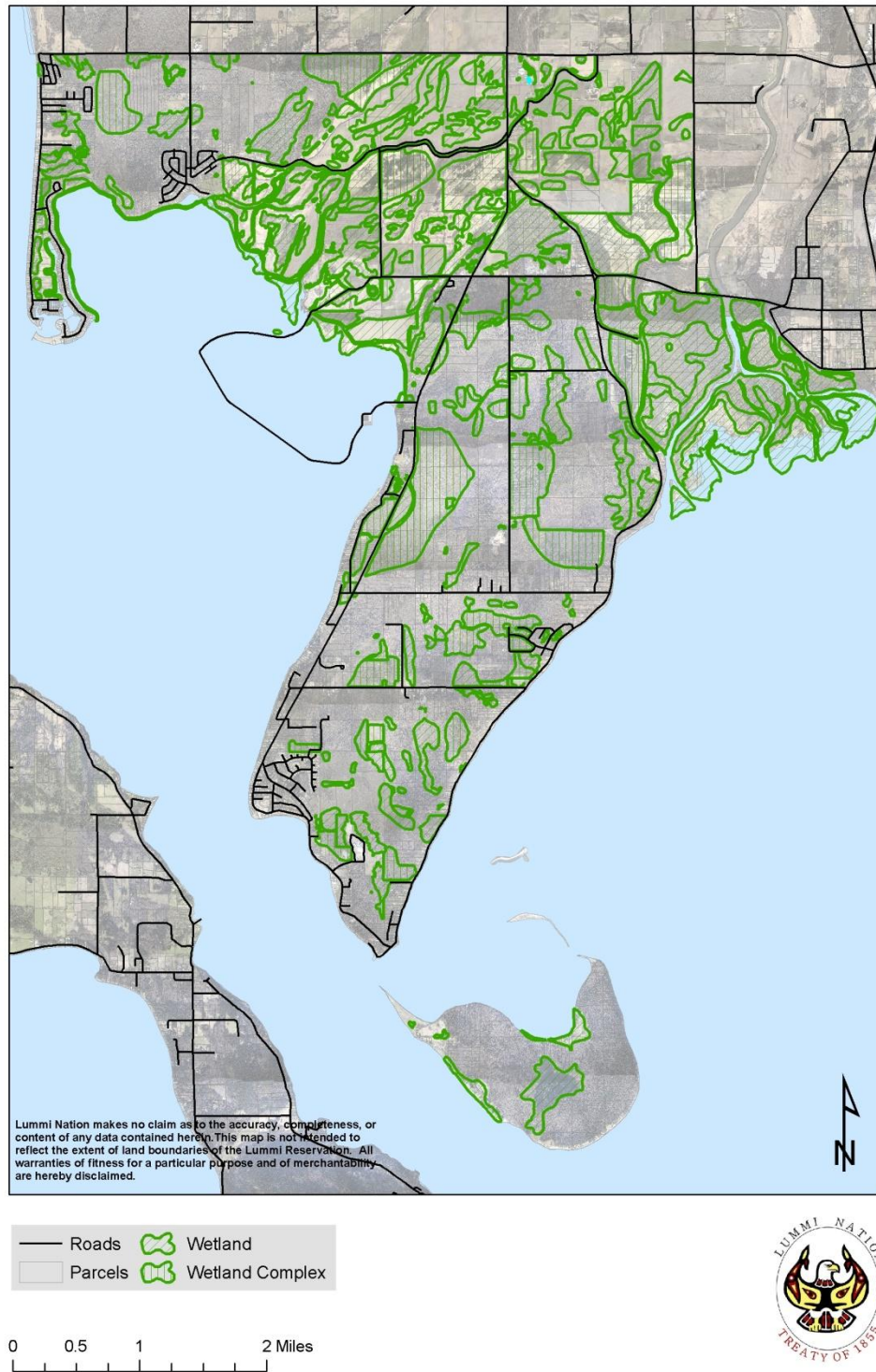
Because of the amount of time and resources required to complete the inventory update the approach was modified starting during Year 4. The wetland function assessments are now deferred until a development action is planned that will impact a wetland and a function assessment is required to determine appropriate mitigation for unavoidable wetland impacts. The modified approach retains the goal to improve the spatial resolution of the Reservation wetland inventory and the effort to classify/rate the Reservation wetlands into one of four categories to support the implementation of Title 17 and the associated determination of the appropriate buffer width. The modification is anticipated to allow more of the

Reservation wetlands to be visited during a year and to accelerate the completion of the inventory update.

At the end of Year 6 of this update effort, a total of 163 wetland areas were evaluated. As 214 wetland areas were identified as part of the 1999 Reservation-wide inventory, approximately 76 percent of the wetlands on the Reservation have been evaluated. The percentage of the total number of Reservation wetlands evaluated is actually less than 76 percent since this update effort has also identified a number of smaller wetlands that were not identified during the 1999 inventory.

Future phases of this study will include estuarine wetlands, which are Category 1 wetlands if they are relatively undisturbed and are larger than one acre. Estuarine wetlands are not included in the classes of wetlands that are covered by the WAFAM method at this time, so a different method will be needed, or the evaluation of these wetlands will have to be delayed until the methodology is developed.

Figure 4 - Best Available Wetland Inventory Map (November 2008)



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APPENDIX A – INDIVIDUAL WETLAND MAPS

APPENDIX B – SAMPLE OF WETLAND RATING WORKSHEET

